

Work Order ID 137438

September 30, 2015 3:31:47 PM

U/R

137438

Page 1

Item ID: D350-748-103

Revision ID: ~~URE 15-561~~

Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015 Start Qty: 1.00 *1*

Required Date: 10/14/2015 Req'd Qty: 1.00 *1*

Reference:

N900040100

Setup Start *NS1*

Stop *NS2*

Cust Item ID:

Customer:

Approvals:

Process Plan: SH

Date: 12 01 50 930

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start *NR1*

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr		Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
D350-748-143	A U/R	OK	6						MLJ 15-11-27

100 Document Control 0.00

100

DC

Doc.Control -USB or Paperwork

DOCUMENT CONTROL

Memo

0.00

Photocopy bluefile & type labels per PPPD350-748-103

CHG001

110 BENDING MACHINE - CROSSTUBES 0.00

110

CNC Bend 1

CNC Delta 100 Bender

BENDING MACHINE - CROSSTUBES

Memo

0.00

Bend tube as per Dwg D350-748-143 using CNC bender program D350F and Folio FT

****UNDER BEND .225" PER SIDE****

****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

★
SEE
Attached

D350-74 -103/137438

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137438

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Item ID: D350-748-103 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: URF 15-561 Stop ***NS2***
 Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube
 Start Date: 9/30/2015 Start Qty: 1.00 ***1*** Cust Item ID:
 Required Date: 10/14/2015 Req'd Qty: 1.00 ***1*** Customer:
 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

Crosstubes

Crosstubes

Memo

DAS 0.00

****VERIFY CROSSTUBE DIMENSIONS AS PER DWG****

U/A 9-89 15-11-20

127

QC15- Crosstube Dimensional Check

0.00

127

QC

Quality Control

Memo

0.00

MARK CUT LINES

DAS
38
9-89

NOV 17 2015

128

0.00

128

Crosstubes

Crosstubes

Memo

0.00

CUT TUBE AT HEIGHT ON FAI SHEET

VERF HEIGHT 23.25 BY QC 15 LEVEL INSPECTOR mmk

VERF TWIST .039 BY QC15 LEVEL INSPECTOR mmk

DL 15/11/17

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Item ID: D350-748-103 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: URF 15-561 Stop ***NS2***
Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube
Start Date: 9/30/2015 Start Qty: 1.00 *1* Cust Item ID:
Required Date: 10/14/2015 Req'd Qty: 1.00 *1* Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Crosstubes	0.00							
130									
Crosstubes	Memo	0.00							
Crosstubes									
	2- Drill Tube as per Dwg D350-748-143 Using DT8876 A,B & C Drill Jigs, Set-up drill table as per QSI 010								
	3- Deburr								
	4- Engrave Part # and Batch # as per Dwg D350-748-143								
	5- Remove all marks from tube within limits of D350-748-143								
	6- Apply a light coat of LPS3 on the interior of tube Batch: _____								
140	QC5- Inspect part completeness to step on W/O	0.00							
140									
QC	Memo	0.00							
Quality Control	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

15-11-17

15-11-20

DAS
9
9-89

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Item ID: D350-748-103 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: URF 15-561 Stop ***NS2***
Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube
Start Date: 9/30/2015 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 10/14/2015 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
174	Outsource process - NDT per QSI038 4.1	0.00							
174									
Outsource2	Memo	0.00							
Outsource process - NDT	ISSUE P/O TO ACUREN: <u>30533</u>								
176	Receive & Inspect for Damage & Mat'l Certs	0.00							
176									
Packaging	Memo	0.00							
Packaging									
178	QC5- Inspect part completeness to step on W/O	0.00							
178									
QC	Memo	0.00							
Quality Control									

NOV 23 2015

1X 8015-11-23

DAS
38
9-30
NOV 27 2015

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***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED
FOR 72HOURS AS PER DWG.***

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Page 7

Item ID: D350-748-103 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: URF 15-561 Stop ***NS2***
Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube
Start Date: 9/30/2015 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 10/14/2015 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00				1			DAS 38 9-89

210

QC

Quality Control

Memo

***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED
FOR 72HOURS AS PER DWG.***

NOV 27 2015

220	Pick Kit	0.00							
-----	----------	------	--	--	--	--	--	--	--

220

Packaging

Packaging

Memo

DAS
28
9-89

NOV 27 2015

DAS
28
9-89

230	QC4- 100% Inspect kits for completeness	0.00							
-----	---	------	--	--	--	--	--	--	--

230

QC

Quality Control

Memo

1

EB

15-11-27

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Item ID: D350-748-103 **Accept** ***N900040100*** **Setup Start** ***NS1***
Revision ID: URF 15-561 **Stop** ***NS2***
Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube
Start Date: 9/30/2015 **Start Qty:** 1.00 ***1*** **Cust Item ID:**
Required Date: 10/14/2015 **Req'd Qty:** 1.00 ***1*** **Customer:**
Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____ **Run Start** ***NR1***
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____ **Stop** ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00					28		
240						IX	9-89		
Packaging	Memo	0.00					BAS		NOV 30 2015
Packaging	Identify and pack for shipping as per PPP D350-748-103						27		
	Location: _____						9-89		
	PPP Rev: <u>FG35</u>								
250	QC21- Final Inspection - Work Order Release	0.00							
250									DEC 01 2015
QC	Memo	0.00							
Quality Control									

MJS
 15-12-2015

Picklist Print

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Page.1

Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP REV:A 15.03.23 NEW ISSUE DD VERF:JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D350-748-143TRN

Manufactured

No

Each

9.0000

1

D350-748-143TRN

SS Crosstube Turning Detail

1 BC 15/11/12

Location

Loc Qty

Loc Code

LG003

9

129473

1

135154

1

135156

1

135157

1

135158

1

135159

1

135160

1

135161

1

135162

1

D3502-1

Manufactured

No

Each

28.0000

2

D3502-1

Support

DAS
41
9-89

15-11-26

Location

Loc Qty

Loc Code

LG052

28

130349

28

Each

54.0000

2

D5123-7

Manufactured

No

D5123-7

Clamp Cushion

DAS
41
9-89

15-11-26

Location

Loc Qty

Loc Code

LG052

54

131194

16

133492

12

136671

26

Picklist Print

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137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

AETC-1032

Purchased

No

Each

20.0000

1

AETC-1032

DAS
41
9-89

15-11-26

Insert

Location

Loc Qty

Loc Code

ST547

20

m133002

20

1

NAS1149C0363R

Purchased

No

Each

1,140.000

1

NAS1149C0363R

DAS
41
9-89

15-11-26

Washer

Location

Loc Qty

Loc Code

FP001

60

114742

60

GA

506

m133077

506

ST260a

494

m133077

494

ST271

80

m130673

20

m132763

60

MS21920-20

Purchased

No

Each

126.0000

2

MS21920-20

DAS
41
9-89

15-11-26

Clamp

Location

Loc Qty

Loc Code

FG

2

122254

2

LG

50

m133134

50

LG050

7

m128650

7

LG056

67

m132675

67

2

Picklist Print

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Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

MS51958-63

Purchased

No

Each

42.0000

1

DAS

41

9-89

15-11-26

MS51958-63

Screw

**

Location

Loc Qty

Loc Code

ST273

42

m131886

42

AN4-6A

Purchased

No

220

Each

242.0000

16

16

DAS

6

9-89

DAS

28

9-89

AN4-6A

BOLT

**

133314

NOV 26 2015

Location

Loc Qty

Loc Code

CA

143

M128403

43

M130851

100

ST345

99

M128403

8

M131153

91

D3500-1

Manufactured

No

220

Each

11.0000

4

4

D3500-1

Saddle

**

138663

SW

DAS

28

9-89

Location

Loc Qty

Loc Code

ST406

11

129373

10

131168

1

Picklist Print

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Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

89.0000

4

4

AN5-32A

Bolt

[Handwritten Signature]

DAS

6

9-89

DAS

28

9-89

Location

Loc Qty

Loc Code

ST299A

30

m132857

30

ST336

52

m132536

52

ST337

7

m131139

7

4

NAS1149D0463J

Purchased

No

220

Each

2,505.000

32

32

NAS1149D0463.J

WASHER

[Handwritten Signature]

133287

DAS

6

9-89

NOV 26 2015

Location

Loc Qty

Loc Code

GA

41

M129390

41

ST269

2464

M129682

86

M130799

371

M132317

125

M132677

888

M133077

994

DAS

28

9-89

Picklist Print

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Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

D3501-1

Manufactured No

220

Each

327.0000

16

16

D3501-1

Bushing

DAS

6

9-89

DAS

28

9-89

Location

Loc Qty

Loc Code

ST039

176

130742

14

135919

162

ST046

1

125925

1

ST051A

150

135918

150

AN4-41A

Purchased

No

220

Each

187.0000

8

8

AN4-41A

Bolt

DAS

6

9-89

DAS

28

9-89

Location

Loc Qty

Loc Code

ST312A

138

m130726

8

m132189

130

ST342

49

m130716

49

MS21042L5

Purchased

No

220

Each

391.0000

4

4

MS21042L5

Nut

133363

DAS

28

9-89

Location

Loc Qty

Loc Code

GA

146

m127813

146

ST260a

197

m132677

197

ST305

48

m127813

19

m131340

21

m132123

8

DAS

6

9-89

NOV 26 2015

Picklist Print

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Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

1,426.000

24

24

MS21042L 4

Locknut

133363

DAS

NOV 26 2015

9-89

DAS

28

9-89

Location

Loc Qty

Loc Code

FP001

2

m124231

2

GA

112

m127813

112

ST260a

170

m130799

56

m131803

6

m132262

108

ST305

1142

m128300

8

m130388

7

m130922

97

m131618

12

m132123

56

m132382

962

Picklist Print

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Work Order ID: 137438

137438

Parent Item: D350-748-103

D350-748-103

Parent Item Name: AS350 / AS355 Stainless Steel Fwd Crosstube

Start Date: 9/30/2015

Required Date: 10/14/2015

Start Qty: 1.00

Required Qty: 1.00

NAS1149D0563J

Purchased

No

220

Each

964.0000

8

8

NAS1149D0563.I

Washer



Location

Loc Qty

Loc Code

GA

53

m125807

53

ST260a

428

m130799

63

m132035

55

m132256

10

m133134

300

ST269

464

m128257

156

m132677

308

ST271

19

m131026

19

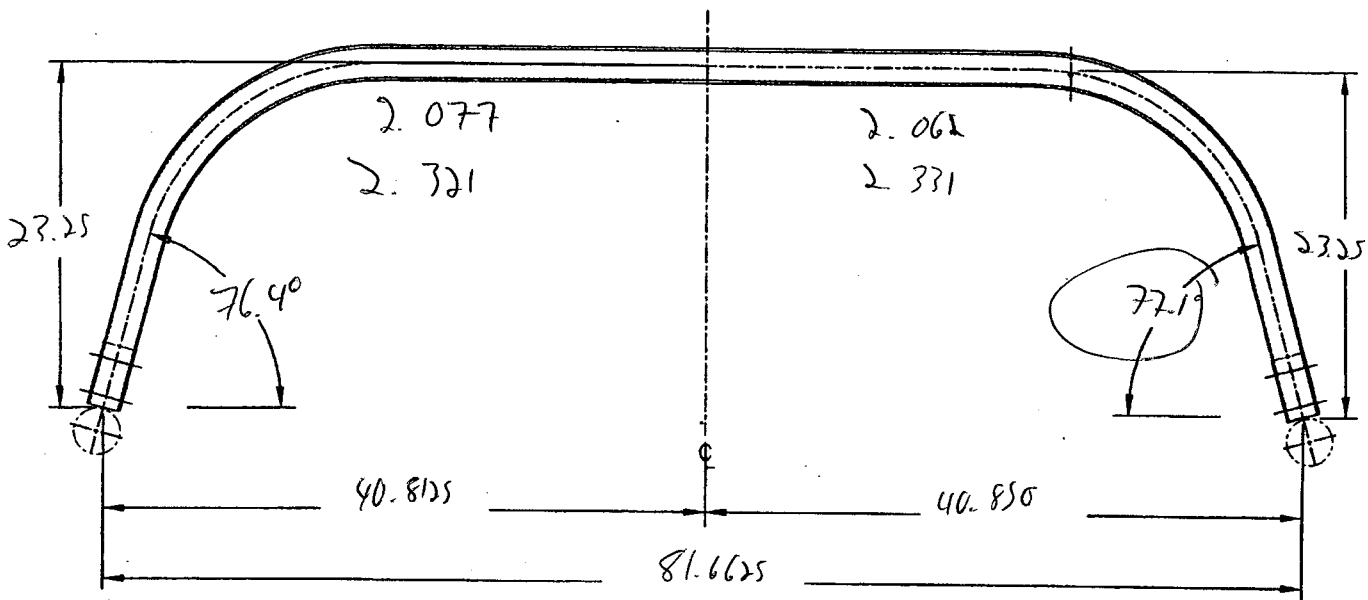
DAS
6
9-89

DAS
28
9-89

NOV 26 2015

DART AEROSPACE LTD		Work Order: 137438
Description: Crosstube High Fwd, SS (AS350/355)		Part Number: D350-748-103
Inspection Dwg: D350-748-143	Rev: A	Page 1 of 1

Required Dimension	Min	Max
Height	23.00	23.50
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	--
Crushing	--	8%
Twist	--	0.38



	Side A	Side B
Bending Passes	28	33
Crushing	5.5%	6.1%
Comments		
Eric Berniquez		

QC15 Inspection		DAS
Date		33
		NOV 17 2015

Rev	Date	Change	Revised by	Approved
A	15.09.09	New Issue	KJ	AA

Item	Qty	Part Number	Description
	X	D350-748-143	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	1	D6021-125	CROSSTUBE
2	2	D3502-1	SUPPORT
3	2	D5123-7	CLAMP CUSHION
4	1	AETC-1032	INSERT
5	2	MS21920-20 OR MS21920-21/-22	CLAMP (PER DART SPEC. M-MS21920-20/-21/-22)
6	1	NAS1149C0363R	WASHER (OR AN960C10)
7	1	NAS1635-3-8	SCREW (OR MS51958-63)
8	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6021-125 (17-4PH)
FINISHED LENGTH AFTER TURNING = 112.270±0.06 (AFTER BENDING/TRIMMING = 110.27 REF)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER 'D350-748-143' AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.280 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- 10) BLENDED OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- 12) MAX AMPLITUDE OF RIBBLING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 13) MAX TWIST: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- 14) TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

UNDER REVIEW

15/4/26

URF 15-561

20150930

SH 137438

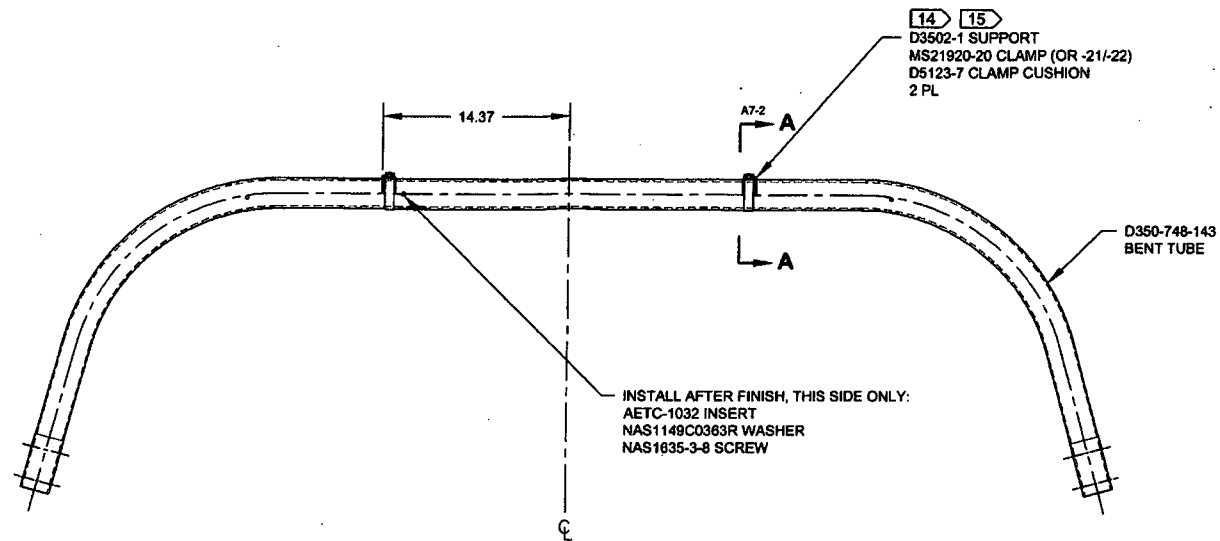
RELEASED

2015 MAR 18

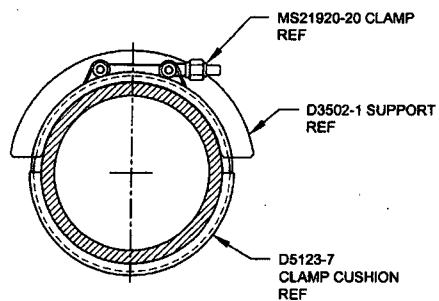
PECN 15-547

A	NEW ISSUE	CP	15.01.21
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	15.01.21		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-143	REV. A SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
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**D350-748-143
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 6X

UNDER REVIEW

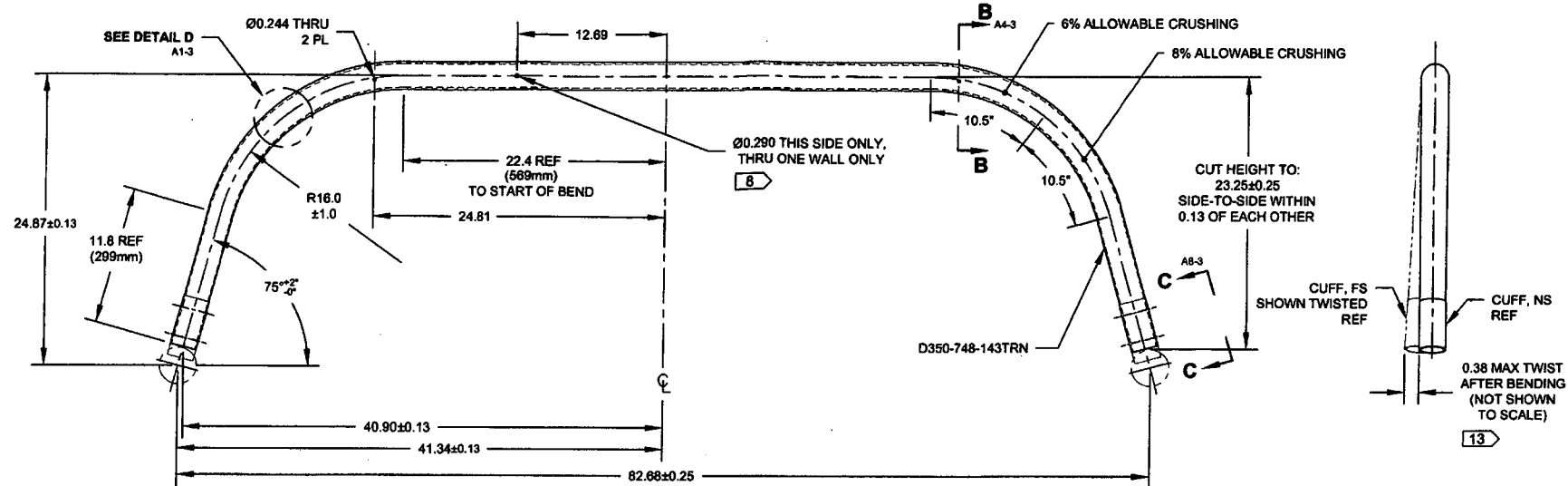
9/15/14/23

RELEASED

2015 MAR '18

47 ECU-15-547

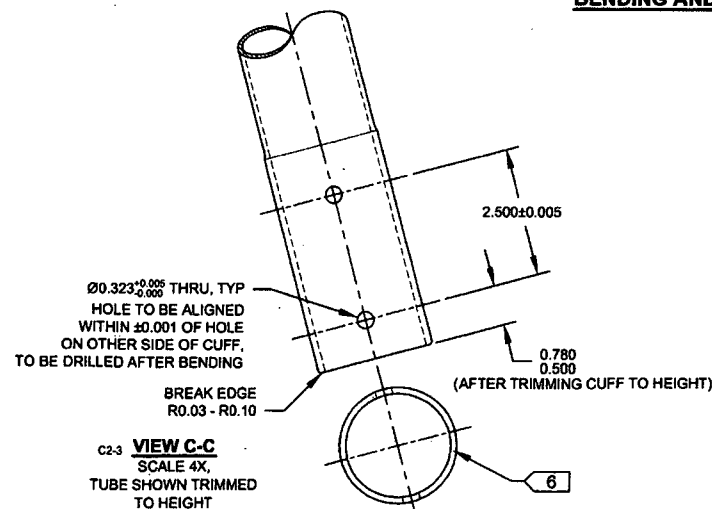
DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. A
MFG. APPR.		D350-748-143	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.01.21	COPYRIGHT © 2015 BY DART AEROSPACE LTD	
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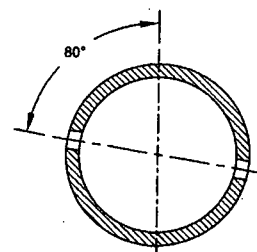
D350-748-143
BENDING AND DRILLING DETAIL 11

RELEASED

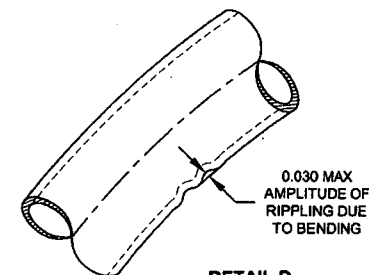
2015 MAR 18



VIEW C-C
SCALE 4X,
TUBE SHOWN TRIMMED
TO HEIGHT



SECTION B-B D3-3
SCALE 6X



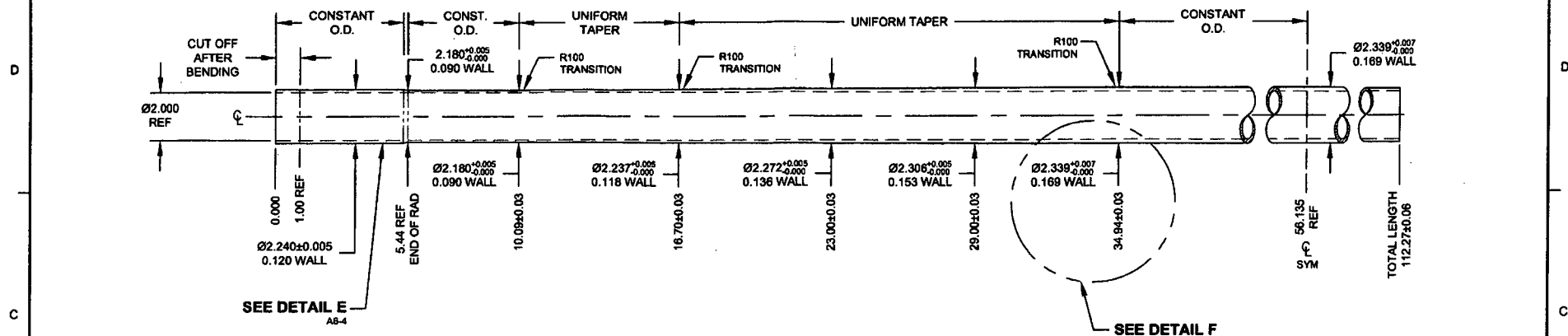
DETAIL D D7-3
SCALE 4X
RIPPING EXAGGERATED

UNDER REVIEW

15/4/28

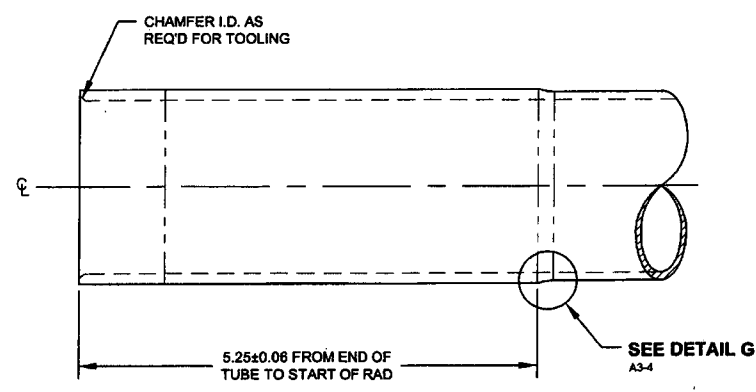
DESIGN	qp	DART AEROSPACE LTD	
DRAWN	qp	HAWKESBURY, ONTARIO, CANADA	
CHECKED	A.P.	DRAWING NO.	REV. A
MFG. APPR.		D350-748-143	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.01.21	COPYRIGHT © 2015 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMBINED OR IN ANY OTHER MANNER WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

8 7 6 5 4 3 2 1

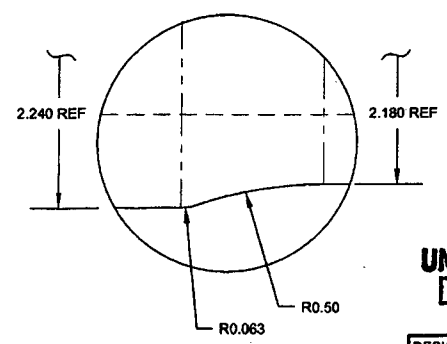


**D350-748-143TRN
TURNING DETAIL**

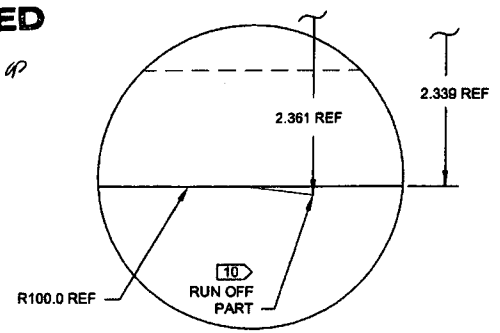
RELEASED
2015 MAR 18 *ap*



**DETAIL E:
CROSSTUBE CUFF** C7-4
SCALE 3X



**DETAIL G:
CUFF TRANSITION** A5-4
NOT TO SCALE



**DETAIL F:
TOOL RUN-OFF** C3-4
NOT TO SCALE

UNDER REVIEW
15/4/24

DESIGN	<i>ap</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	<i>ap</i>		
CHECKED	<i>ap</i>	DRAWING NO. D350-748-143	REV. A
MFG. APPR.	<i>[Signature]</i>	TITLE CROSSTUBE (AS 350/355 HI FWD)	SHEET 4 OF 4
APPROVED	<i>[Signature]</i>	SCALE	NTS
DE APPR.	<i>[Signature]</i>	COPYRIGHT © 2015 BY DART AEROSPACE LTD	
DATE	15.01.21	THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMBINED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

8 7 6 5 4 3 2 1

DQA:

Date: 16/02/04

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date: 16/02/03

Work Order update only ☐

Work Order: <u>137438</u>		DISPOSITION		AGAINST DEPARTMENT/PROCESS					
Part No. <u>D350-748-103</u>		Rework ☒		Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☒		
NCR No. <u>116-5566</u>		Scrap ☐		Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐		
		Use-as-is ☐		Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐		
		Suspected Unapproved ☐		Large Fab ☐	Composite ☐	Supplier ☐			
Date: 15/10/1		Step #: 180		QTY Effective: 1			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition			DAS 12 15/10/1 9-89		
Prep surface per QSI 005 4.1.4				Axalta 132058 B/N: 132520 Axalta Metabok 2305 B/N: 132474			Completed By DAS 41 15-11-23 9-89 Lead hand / Supervisor Approval Verification DAS 9 15-12-03 9-89		
				QC / QA Coordinator Approval DAS 9 DEC 03 2015 9-89					
Root Cause				FAULT CATEGORY					
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	☒ Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	☒ Product Improvement	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐								
Misidentified ☐	Past Due ☐	OTHER :							

DQA:

Date:



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date:

Work Order update only

Work Order: <u>137438</u> Part No. <u>0350-748 103</u> NCR No. <u>16-5552</u>		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☒ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%;"> <tr> <td>Skid-tube ☐</td> <td>Cross tube ☒</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐																																															
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Large Fab ☐	Composite ☐	Supplier ☐																																																																					
Date: <u>15/11/16</u>		Step #: <u>110</u>		QTY Effective: <u>1</u>		MRB (QSI042) Approval DAS 12 9-89 <u>15/11/16</u>																																																																	
Description Work Order Deviation				Disposition																																																																			
<u>Angle after bending is 0.1° over tolerance.</u>				<u>Acceptable.</u>																																																																			
				Completed By <u>1158</u> <u>12</u> <u>15/11/16</u>																																																																			
				Lead hand / Supervisor Approval Verification <u>[Signature]</u> <u>15-11-17</u>																																																																			
				QC / QA Coordinator Approval DAS 9-89 <u>NOV 17 2015</u>																																																																			
Root Cause <table style="width:100%;"> <tr><td>Environment ☐</td><td>No Re-verification ☐</td></tr> <tr><td>Design ☐</td><td>Operator ☐</td></tr> <tr><td>Doc/Data ☐</td><td>Offset/Setup ☐</td></tr> <tr><td>Equip/Tooling ☐</td><td>Supplier ☐</td></tr> <tr><td>Handling/Pre ☐</td><td>Training ☐</td></tr> <tr><td>Material ☒</td><td>Use for Testing ☐</td></tr> <tr><td>Internal Transport ☐</td><td>Poor Information ☐</td></tr> <tr><td>Tribal Knowledge ☐</td><td>Rushing ☐</td></tr> <tr><td>LOA ☐</td><td>Product Improvement ☐</td></tr> <tr><td>Substation ☐</td><td>Process Improvement ☐</td></tr> <tr><td>Past Expiry Date ☐</td><td>Manufacturing Process ☐</td></tr> <tr><td>Misidentified ☐</td><td>Past Due ☐</td></tr> </table>				Environment ☐	No Re-verification ☐	Design ☐	Operator ☐	Doc/Data ☐	Offset/Setup ☐	Equip/Tooling ☐	Supplier ☐	Handling/Pre ☐	Training ☐	Material ☒	Use for Testing ☐	Internal Transport ☐	Poor Information ☐	Tribal Knowledge ☐	Rushing ☐	LOA ☐	Product Improvement ☐	Substation ☐	Process Improvement ☐	Past Expiry Date ☐	Manufacturing Process ☐	Misidentified ☐	Past Due ☐	FAULT CATEGORY <table style="width:100%;"> <tr><td>Pressure/Forced ☐</td><td>Temperature/Cure ☐</td><td>Power Loss/Surge ☐</td><td>Positioned Wrong ☐</td></tr> <tr><td>Bending ☐</td><td>Set-up ☐</td><td>Folio/Program ☐</td><td>Outside Dimensions ☐</td></tr> <tr><td>Centre Not Concentric ☐</td><td>BOM/Route ☐</td><td>Grain ☐</td><td>☒ Over/Under tolerance</td></tr> <tr><td>Cracks ☐</td><td>Broken/Damage/Defect ☐</td><td>Weld ☐</td><td>Part Incorrect ☐</td></tr> <tr><td>Crimp/Kink/Ripple/Wave ☐</td><td>Inspection Incomplete/Unqualified ☐</td><td>Wrong Stock Pulled ☐</td><td>Part Lost/Missing ☐</td></tr> <tr><td>Cuffs ☐</td><td>Contamination ☐</td><td>Out of Sequence ☐</td><td>Part Moved ☐</td></tr> <tr><td>Crushing ☐</td><td>Countersink ☐</td><td>Off-set ☐</td><td>Drawing ☐</td></tr> <tr><td>Heat Treat ☐</td><td>Cut Too Short ☐</td><td>Mislabeled ☐</td><td>Finish ☐</td></tr> <tr><td>Wave/Twist in Tube ☐</td><td>Instructions Incomplete/Unclear ☐</td><td>Fit/Function ☐</td><td>Misread ☐</td></tr> <tr><td>Marks/Chatter ☐</td><td>Drill Holes ☐</td><td>Misaligned/off center ☐</td><td>Turning Sequence ☐</td></tr> </table>				Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	☒ Over/Under tolerance	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐
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OTHER: ☐																																																																							



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO30533**

Purchase Order Date 11/20/2015

PO Print Date 11/23/2015

Page Number 3 of 6

Order From :
SKYSERVICE
6120 MIDFIELD ROAD
MISSISSAUGA, ONTARIO L5P 1B1
CANADA

VC-SKY001

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name
Vendor Phone 905-678-5636

Ship To Contact
Ship To Phone
Ship Via: Delivered
Ship Acct:

Buyer Chantal Lavoie
Customer POID
Customer Tax # 10127-2607
Terms Net 30
Currency CAD
FOB FCA - (Free Carrier)

Line Total: \$115.00

6 137438

D350-748-103
CROSSTUBE

11/23/2015

1.00

\$115.00

\$115.00

Yes

11/23/2015

SAME AS ABOVE

Line Total: \$115.00

7 137439

D350-748-103
CROSSTUBE

11/23/2015

1.00

\$115.00

\$115.00

Yes

11/23/2015

SAME AS ABOVE

Line Total: \$115.00

8 138647

D350-748-203
CROSSTUBE

11/23/2015

1.00

\$115.00

\$115.00

Yes

11/23/2015

SAME AS ABOVE

Note:

11/23/2015



skyservice Work Order Traveler

Sky Service F.B.O. Inc.

DOT APP 53-89 / EASA 145.7142 / BDA AMO 385

WO #: MWO26474	Customer: Dart Aerospace Ltd.	Dept: NDT YUL	Reference: 30533
Descr:	PN:	S/N:	Qty: 1
Make:	Model:	Reg:	A/C S/N:
TSN:	CSN:	TSO:	
Task: UNSCHEDULED			Sequence: 1

Work Required:

CARRY OUT NDT ON 13 CROSSTUBES AS PER PO30533

2 AFT CROSSTUBES, ITEM ID# D212-664-207 , WORK ORDERS ID# 136710, 138508

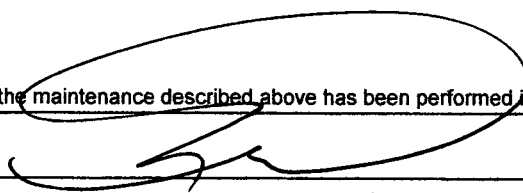
6 STAINLESS STEEL AFT CROSSTUBES, ITEM ID# D350-748-203 , WORK ORDERS ID# 138647, 138648, 138649, 138650, 138661, 138662

5 STAINLESS STEEL FWD CROSSTUBES, ITEM ID# D350-748-103 , WORK ORDERS ID# 137437, 137438, 138714, 137436, 137439

801511-23

Action Taken:						Date:	Initial/Stamp:
LPI C/O IAW ASTM E-1417M13 NO CRACK FOUND PEN. ZL-56, MPO13600, UV M-20141, CLEANER SKC-S MPO13923 , DEV. MPO11715						NOV 20 2015	 
Description	Location	P/N	Qty	Batch	S/N Off	S/N On	

I certified that the maintenance described above has been performed in accordance with the applicable standard of airworthiness.

Signature: 	ACA/SCA Stamp 	Date: NOV 20 2015
Name: RAFIK MELIKIAN		

QA Closed:

Date:

WORK ORDER NON-CONFORMANCE / UPDATE

Work Order: 137438Part No. D350-748-103

NCR No.

DISPOSITION

 Rework ☒
 Scrap ☐
 Use-as-is ☐
 Suspected Unapproved ☐
Work Order update only ☐

AGAINST DEPARTMENT/PROCESS

 Skid-tube ☐
 Machining ☐
 Thermoforming ☐
 Large Fab ☐

 Cross tube ☐
 Small Fab ☐
 Finishing ☐
 Composite ☐

 Water Jet ☐
 Prod. Eng. Coord. ☐
 Rec/Store/Packaging ☐
 Supplier ☐

 Engineering ☐
 Quality ☐
 Other ☐

Date:

15.11.26

Step #:

QTY Effective:

Description Work Order Deviation

AETC-1032 INSERTS BREAKING ON INSTALLATION

 DAS
 9
 9-89

Disposition

BASED ON ENG TESTING IT WAS FOUND THAT INSTALLATION IS MORE RELIABLE IF INSTALLATION PRESSURE (AIR HOSE) IS REGULATED TO 50 PSI AND INSTALLATION HOLE IS REAMED TO Ø 0.290 IN ACCORDANCE MANUFACTURERS INSTRUCTIONS. OPEN PART TO ADD NOTE TO STEP # 200 WHICH READS "LIMIT AIR PRESSURE TO 50 PSI WHEN INSTALLING AETC-1032 INSERT AND ONLY EXPAND INSERT ONCE"

MRB (QS1042) Approval

AL15.11.26

Completed By

Lead hand / Supervisor
Approval VerificationQC / QA Coordinator
Approval

Root Cause

Environment ☐	No Re-verification ☐
Design ☐	Operator ☐
Doc/Data ☐	Offset/Setup ☐
Equip/Tooling ☐	Supplier ☐
Handling/Pre ☐	Training ☐
Material ☐	Use for Testing ☐
Internal Transport ☐	Poor Information ☐
Tribal Knowledge ☐	Rushing ☐
LOA ☐	Product Improvement ☐
Substation ☐	Process Improvement ☐
Past Expiry Date ☐	Manufacturing Process ☐
Misidentified ☐	Past Due ☐

 Pressure/Forced ☐
 Bending ☐
 Centre Not Concentric ☐
 Cracks ☐
 Crimp/Kink/Ripple/Wave ☐
 Cuffs ☐
 Crushing ☐
 Heat Treat ☐
 Wave/Twist in Tube ☐
 Marks/Chatter ☐

FAULT CATEGORY

 Temperature/Cure ☐
 Set-up ☐
 BOM/Route ☐
 Broken/Damage/Defect ☐
 Inspection Incomplete/Unqualified ☐
 Contamination ☐
 Countersink ☐
 Cut Too Short ☐
 Instructions Incomplete/Unclear ☐
 Drill Holes ☐

 Power Loss/Surge ☐
 Folio/Program ☐
 Grain ☐
 Weld ☐
 Wrong Stock Pulled ☐
 Out of Sequence ☐
 Off-set ☐
 Mislabelled ☐
 Fit/Function ☐
 Misaligned/off center ☐

 Positioned Wrong ☐
 Outside Dimensions ☐
 Over/Under tolerance ☐
 Part Incorrect ☐
 Part Lost/Missing ☐
 Part Moved ☐
 Drawing ☐
 Finish ☐
 Misread ☐
 Turning Sequence ☐

OTHER:

4.0 WEIGHT AND BALANCE

REFERENCE ONLY

The following weight and balance information is for Dart crosstube installations only. This data should be similar to the existing installation. Differences from the parts removed are the responsibility of the installer.

DART CROSSTUBE	FWD/ AFT	WEIGHT	STA	MOMENT
D350-748-101 D350-748-103	Fwd	35.2 lb (16.0 kg)	106.3 in (2.70 m)	3742 lb-in (43.2 kg-m)
D350-748-201 D350-748-203	Aft	34.7 lb (15.7 kg)	162.4 in (4.12 m)	5635 lb-in (64.7 kg-m)

5.0 PARTS LIST

Qty -101	Qty -103	Qty -201	Qty -203	Part Number	Description
X				D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X			D350-748-103	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD (SS)
		X		D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
			X	D350-748-203	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT (SS)
1				D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1			D350-748-143	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD (SS)
		1		D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
			1	D350-748-243	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT (SS)
*2	*2	*2	*2	D3502-1	SUPPORT
*2	*2	*2	*2	D5123-7	CLAMP CUSHION
*1		*1		AELS-1032-225	INSERT
	*1		*1	AETC-1032	INSERT
*2	*2	*2	*2	MS21920-20	CLAMP (OR MS21920-21/-22)
*1		*1		MS27039-1-10	SCREW
	*1		*1	NAS1685-3-8	SCREW (OR MS51958-63)
*1		*1		NAS1149D0363J	WASHER (OR AN960JD10)
	*1		*1	NAS1149C0363R	WASHER (OR AN960C10)
4	4	4	4	D3500-1	SADDLE
16	16	16	16	D3501-1	BUSHING
16	16	16	16	AN4-6A	BOLT
8	8	8	8	AN4-41A	BOLT
4	4	4	4	AN5-32A	BOLT
32	32	32	32	NAS1149D0463J	WASHER (OR AN960JD416)
8	8	8	8	NAS1149D0563J	WASHER (OR AN960JD516)
24	24	24	24	MS21042L4	NUT (OR MS21042-4)
4	4	4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/-143/-241/-243 ASSEMBLIES ABOVE

DQA: ☐ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☒ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☒ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date : 16-01-19		Step #: 200		QTY Effective : ①			MRB (QS1042) Approval DAS 9 9-89 16-01-18		
Description Work Order Deviation				Disposition				Completed By	
AETC-1032 inserts breaking on installation P.C. equipment, no air regulation on tool				had on work order to limit air pressure to 50 psi when installing AETC-1032 insert				DAS 10 9-89 16-01-19	
								Lead hand / Supervisor Approval Verification DAS 9 9-89 16-01-19	
								QC / QA Coordinator Approval DAS 9 9-89 16-01-19	
Root Cause				FAULT CATEGORY					
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☒ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐				Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ ☒ Broken/Damage/Defect Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐					
OTHER : _____									